

over Shimida in view of Miyaji, et al. (JP 41-1174467A) and Yamanaka, et al. (US 5,986,729). Claims 4, 10, 11, 13, 15, 16, 20-22, 27-33 and 35-41 are rejected under 35 USC §103(a) as being obvious over Shimida in view of Miyaji and Yamanaka, further in view of Asuma, et al. (JP 2000-019527A). Claim 7 is rejected under 35 USC §103(a) as being obvious over Shimida in view of Tsunoda, et al. (US 4,938,569). Claim 14 is rejected under 35 USC §103(a) as being obvious over Shimida in view of Miyaji, Yamanaka, and Asuma, further in view of Koe (US 6,097,462). Applicant respectfully traverses all rejections, for at least the reasons set forth below.

With respect to Shimida, each of claims 1, 5, 17, 23 and 34 recite a multi-domain alignment active-matrix liquid crystal display device comprising first and second transparent insulating plates arranged to oppose each other, the first plate having, *inter alia*, pixel electrodes connected to thin-film transistors. An orientation layer is formed on each pixel electrode, said orientation layer is formed into a curved surface. Further, columnar spacers are provided between the two opposing plates.

In contrast, Shimida teaches a method of producing a reflection-type liquid crystal display, wherein an insulating film (42, Fig. 14) is configured to have a roughened surface, consistent with various embodiments of the prior art (see Col. 2, ll. 44-46, Figs. 3A-3D, 4A-4F). The form and function of the roughened surface is very different from the curved surface recited in the claims. Further, the roughened surface of Shimida is not formed in an orientation layer, but is instead formed in an insulating layer (42) that underlies an orientation film (44). As seen in Figs. 14 and 16 of Shimida, the orientation film (44) is generally flat, neither curved nor even roughened.

Further, Shimida does not teach columnar spacers as recited in the claims. At col. 11, ll. 12-17, Shimida teaches that an adhesive including 7 $\mu$ m diameter spacers applied by a screen-printing process. Shimida does not expressly state that the spacers are columnar. Neither does Shimida suggest that the spacers are columnar. A screen-printing process would inherently orient the spacers randomly, which would defeat the function of columnar spacers. Further, Shimida teaches only one dimension of the spacers. Therefore, one of ordinary skill in the art could only infer for Shimida's disclosure that the spacers are spherical, not columnar.

Shimida does not expressly or inherently teach columnar spacers. Neither does Shimida teach an orientation film formed into a curved surface, as recited in the claims. Moreover, the orientation layer present in Shimida is neither curved nor roughened as recited in the claims. "A prior art reference anticipates a claim only if the reference discloses, either expressly or inherently, every limitation of the claim." *Rowe v. Dror*, 112 F. 3d 473, 42 USPQ2d 1550 (CAFC 1997).

Respecting claims 2, 3, 8, 9, 18, 19, 25 and 26, the Examiner applies Shimida as applied to claims 1, 5, 6, 17, and 23, further in view of Yamanaka and Miyaji. The secondary references are applied for their teachings of columnar spacers disposed approximately at a center of the orientation layer, and that said columnar spacers have a diameter that becomes progressively smaller in the direction of a second plate.

The Examiner asserts in the office action that Yamanaka teaches a columnar spacer disposed approximately at a center of the orientation layer. Fig. 8 belies this assertion. The spacers of Yamanaka are not disposed at a center, but are distributed in an array over the orientation layer. As shown in Fig. 9, the spacers are clearly not located at

a center of an orientation layer, rather to the sides. Further, Yamanaka teaches no orientation layer, only an electrode (102d).

Further, the claims define features neither taught nor suggested in the references individually, or in combination. For example, claim 3 recites that the orientation layer defines a cavity recessed toward the first plate. This limitation is not addressed in the rejection, nor is the feature taught or suggested by the applied prior art.

Neither Yamanaka nor Miyaji cure the deficiency of Shimida with respect to the underlying claims. The claims under rejection also define additional features not taught or suggested by the references singly or in combination. Therefore, the rejection is improper, and should be withdrawn.

Respecting claims 4, 10, 11, 13, 15, 16, 20-22, 27-33 and 35-41, the Examiner applies Shimida in view of Miyaji and Yamanaka, further in view of Asuma, et al. The Asuma reference is applied for the teaching of a columnar spacer that has a diameter that becomes progressively larger in the direction of a second plate.

Asuma does teach or suggest a curved surface in an orientation layer. In contrast, the surface of the orientation layer shown in Figs. 2 and 8 of Asuma show a roughened surface, not contiguously curved. Therefore, Asuma does not remedy the deficiency of Shimida, Yamanaka and Miyaji with respect to the underlying claims.

Further, the claims define features neither taught nor suggested in the references individually, or in combination. For example, claims 15 and 16 recite that liquid crystal molecules contiguous to the surface of the columnar spacer are aligned substantially parallel to the surface of the columnar spacer. Claims 20, 22, 27, 31 and 35, recite that the columnar spacer has a side wall adapted to assist the alignment of the liquid crystal

molecules. The Examiner asserts that in the alleged combination, "liquid crystal molecules contiguous to the surface can possibly be aligned substantially parallel to the surface of the columnar spacer," (p. 6, emphasis added). The Office may not resort to speculation, unfounded assumptions, or hindsight reconstruction to support deficiencies in its factual basis. See *In re GPAC, Inc.*, 57 F.3d 1573, 35 USPQ2d 1116, 1123 (Fed. Cir. 1995).

Further, claim 30 recites that the pixel electrode defines a curved or slanted protrusion toward the counter electrode. This limitation is nowhere addressed in the statement of the rejection. It is neither taught nor suggested by Shimida, Yamanaka, Miyaji, nor Asuma, either alone or in combination.

Asuma does not cure the deficiency of Shimida, Yamanaka, and Miyaji with respect to the underlying claims. The claims under rejection also define additional features not taught or suggested by the references singly or in combination. Therefore, the rejection is improper, and should be withdrawn.

Respecting claim 7, The Examiner applies Shimida as applied to claims 1, 5, 6, 17, and 23, further in view of Tsunoda. Respecting claim 14, the Examiner applies Shimida in view of Miyaji, Yamanaka and Asuma, further in view of Koe. However, neither Tsunoda nor Koe cure the deficiencies with respect to the underlying claims. Neither Tsunoda nor Koe teach or suggest an orientation film formed into a curved surface, either alone, or in combination with the other applied art. Therefore, the rejection is improper, and should be withdrawn.

### CONCLUSION

In light of the foregoing, Applicant respectfully submits that all claims define patentable subject matter, and kindly solicits an early indication of allowance. If the Examiner feels there are any issues that may be resolved by telephone conference, kindly call the undersigned at the earliest convenience.

Respectfully Submitted,



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